AFOEHL REPORT 90-138SA00111GXX

Contracting of Samples for Chemical Analyses

What You Should Know About It

THOMAS C. THOMAS, GS-15

AUGUST 1990

Final Report

AF Occupational and Environmental Health Laboratory (AFSC)
Human Systems Division
Brooks Air Force Base, Texas 78235-5501

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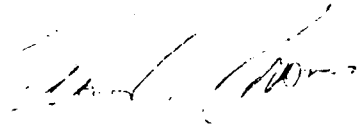

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A paper on Analytical chemistry contracting was presented by Mr Thomas at the 1990 Bioenvironmental Engineering Symposium on May 10, 1990 at Brooks AFB TX. During the question and answer session following his talk, a request was made to have this information made available to base bioenvironmental and civil engineers for their use at base level. This report describes what to look for when selecting a commercial analytical chemistry laboratory and the potential problems that could arise if care in selection is not made.

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PREFACE

On May 10, 1990, Mr Thomas presented a paper to the Bioenvironmental Engineering Symposium at Brooks AFB, TX. During the question and answer session, a participant asked that since the information in the paper would be extremely valuable to Bioenvironmental Engineers and Civil Engineers at the base level, could the paper be made available for their use? This report is in response to that request.

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CONTENTS

INTRODUCTION

A possible scenario: Nowhere AFB has some waste samples that they need some chemical analyses performed on. They have had these barrels of waste stored on base for the past eleven years, but because of their recent discovery, they need results from the analyses to brief the base commander in two days. They know there is a local commercial laboratory, Booneyville Environmental Consultants, Inc. They call them and find that they say they can analyze the samples in 24-hours and the cost is only $159.00 per sample. That's perfect! Should they go this route? What factors should they consider? They are not sure because they don't usually take this approach. What worries them is that they remember reading somewhere that a DoD IG team recently visited a commercial lab used by the Air Force and wrote them up for some serious mishandling of Air Force samples.

PRACTICES THAT LED TO THE IG WRITE UP

In July 1989, the Department of Defense IG Team visited a laboratory working for the Army, Navy, and Air Force in analyzing for toxic waste in soils and waters. They uncovered the following incidents, (Appendix A):

Samples were not tested in compliance with the Contract Laboratory Program (CLP) protocol as required by the Environmental Protection Agency;

Quality Control results for calibration and check standards that did not meet the CLP protocol were electronically manipulated by switching standards that did not meet the CLP criteria with results which did meet the criteria;

Test calibration curves for the analytical standards were determined after the samples were tested. This was in violation of USTHAMA program procedures.

- The gas chromatography/mass spectrographic peaks were manually integrated so that the daily calibration standards would meet the criteria set forth in the USTHAMA QA manual.

- During pesticide analysis, the concentration of the calibration solution used for a particular pesticide was altered. The analyst changed the concentration of the daily concentration standard, but labeled the gas chromatograph peak areas as being that from another standard.

- All samples sent to this laboratory had a holding time date, a certain date before which analysis most be completed. If not analyzed before this date, the analysis will be invalid. This

laboratory's analysts were able to change the sample analysis dates by re-booting the computer in order to meet holding time dates as reported on sample results.

WHAT FACTORS SHOULD BE CONSIDERED IN CHOOSING A LABORATORY

Before awarding a contract, investigation of the lab's capabilities, analysts, QA efforts, costs, and certifications should be thoroughly carried out.

CAPABILITIES: Many commercial labs will tell you what you want to hear, then try to figure out how to do it later. They are in business to do analyses and don't want to turn any away. They figure they can come up with something. A good way to check their capabilities is to check out their available analytical equipment. Generally, the following equipment gives a general idea of their analysis capabilities (Appendix B):

- Gas Chromatographs (with various detectors) - pesticides, industrial hygiene solvent samples, volatiles, PCBs.

- Gas Chromatographs/Mass Spectrometers - organic waste analyses, fuel spill IDs, priority pollutants, positive ID of organic solvents, dioxins.

- Liquid Chromatographs - commercial products, heat sensitive pesticides, fuels, explosives.

- Atomic Absorption Spectrometers (with attachments), ICP - metals.

- TOX & TOC Analyzers, Ion Chromatographs, IR Spectrometer UV-VIS Spectrometers, pH Meter, Furnace and Oven - all wastewater and potable water analyses.

- Polarized Light Microscope - air asbestos.

- Phase Contrast Microscope - bulk asbestos.

ANALYSTS: There are two main requirements that we look for: training and experience. Laboratory technicians are fine for doing analyses, but at least one person with a chemistry degree should be in charge of the lab (Appendix C). Problems will occur when non-chemistry majors are in charge of the lab-persons with a degree in Geology, Botany, or English. Don't laugh, it happens. That knowledge of chemistry for analysis problems that occur is crucial. Experience of the chemists is also critical. Contract labs tend to hire young people just out of college because of lower salaries. That's great for the lab, but they don't teach about environmental and occupational methods and their difficulties in college. It takes a chemist 4-5 years to gain the needed on-the-job experience to fully cope with all problems and methodology requirements. Look for this

experience and ask for resumes. A Ph.D. or Masters degree in environmental chemistry would cut the required experience to 1-2 years.

QUALITY ASSURANCE EFFORTS: Unless a lab has adequate quality assurance efforts, how can you place any trust in their results? If the results are challenged, without adequate QA, there is nothing to back them up.

First of all, the lab needs a person assigned as a QA/QC coordinator (Appendix D). It would be preferable that this would be that person's only responsibility, but not absolutely necessary. This person should have several years experience in QA type efforts.

This coordinator would be responsible for preparing evaluations of all QC samples, maintaining QC records and controls, reviewing results, making sure there are written SOPs and appropriate methods are used, insuring equipment calibration and maintenance, enforcing chain of custody procedures, making inspections of the lab and to maintain various certifications. This person insures that the lab's facilities, equipment, personnel, methods, records and controls, are in conformance with standard quality control guidelines. Don't take verbal assurance, ask for written documentation.

ANALYSES COSTS: Knowing what a reasonable analysis charge is, can be difficult. In the environmental and occupational arena alone, there can be 600-700 individual analyses methods. In the opening example, it showed Booneyville Environmental Consultants charging $159.00 per waste sample. This is a very attractive price but will lead to trouble. Waste analyses include: waste ID of components, ignitability, corrositivity, reactivity, and EP toxicity. AFOEHL/SA has five contractors who have been selected competitively on the basis of qualifications and competitive prices. The average of their prices for waste analysis is $768.00 with a variance of $91.00 between them. How can a laboratory charge only $159.00? Well, for one thing they probably don't use any costly quality assurance procedures in their lab. Secondly, they might use easy or short-cut type methods, which are non approved methods. The resultant data that they'll provide to Nowhere AFB will most likely not be acceptable for DRMO turn in. In the long run, this base could pay a lot more in additional analyses charges, possible storage violation fines, not to mention special attention from the base commander. There are several possible ways to check the lab's prices (Appendix E): if your review of the lab shows a good QA, personnel, and capabilities, their prices most likely will be reasonable. Secondly, AFOEHL/SA can tell what their competitive labs charge and you can compare. Finally, shop around by calling other commercial labs and comparing their prices. A wide variance like $768.00 vs. $159.00, gives you the clue.

CERTIFICATIONS: An excellent way to check out a lab is to check if they are certified in certain areas (Appendix F). To be certified by an agency, they have to prove their capabilities, adequate staff, and quality assurance efforts. They usually undergo an on-site visit to make sure of their claims. Once they are certified, they have to maintain their certification by satisfactory performance on quality control check samples. They also have to undergo periodic site visits by the certifying agencies. It's a good way to assure some of the factors mentioned above. Government agencies like the states and EPA and private agencies like the American Association for Laboratory Accreditation (AALA) certify in environmental analysis. A government agency, the National Voluntary Laboratory Accreditation Program (NVLAP), and a private agency, American Industrial Hygiene Association (AIHA), certify in occupational analyses. Call AFOEHL/SAQ if you have questions on laboratory certification claims, they can help. Some labs have made nontruthful claims about their certifications. Ask to see their agency certifications showing the period of certification and for what analyses.

HOW TO PROTECT YOUR BASE AND THE AIR FORCE

What I am wondering on the IG write up is whether the Army, Navy and Air Force's contracts and work orders spelled out the requirements? Was the lab instructed by the work order to analyze the samples by CLP protocol? Was the lab instructed by the work order to use certain methods with built in quality control procedures? Were they instructed to meet holding times? What was the contractor responsibilities and what was the government responsibilities? If all these points were not covered in the contract/work order, the IG report is just a notification for government use. Legally there is not much that can be done and the money spent on the analyses is wasted. You can do the best checking of a lab's prices, capabilities, staff, QA, but if you haven't written your contract/work order properly, you still may encounter problems. Many times you have to fall back to the contract/work order to hold the lab's "feet to the fire." If you have not included something it always seems to come back to "bite you." AFOEHL/SA spent about 1 1/2 years getting its latest round of contract laboratories aboard. Much time was involved in preparing the contract to cover QA, firm fixed price costs, volume discounts, priority requests, legal requirements, and what analyses are covered by the contract. Selection of the five contract labs took a large part of this time. The contracts will be in effect for 5 years.

Once the contract laboratory is aboard, AFOEHL/SA then issues specific, fixed price work orders (Appendix G). The work order specifies methods required for each analysis. In the work order we add specific instructions on contractor responsibilities for packing, mailing and sample containers. Also, more in-depth instructions are given on following QA procedures and what QA records we want provided with the results. We also specify the analysis turnaround times that

we want. We specify a point of contact at AFOEHL/SA, who the contract lab can contact if any problems or questions occur. We also instruct the lab on how long to maintain all data in their records. It probably sounds like a lot of overkill, but it sure makes the job of chemical analysis contracting a lot easier.

Bases have the awesome responsibility of keeping up with the mounting pile of occupational and environmental requirements. It's amazing they can keep up with their work loads. When their job moves them into making chemical analysis contracting decisions, it becomes much more difficult. Hopefully, this report will clear up a few things.

REFERENCES

1. Analytical Services Operating Instructions, AFOEHL/SA 161-19, Quality Management of Contract Analyses, AFOEHL, Brooks AFB TX 78235-5501 (May 1990).

2. AFOEHL Regulation 70-1, Contracting and Acquisition, AFOEHL, Brooks AFB TX 78235-5501 (22 May 1989).

3. AFOEHL Regulation 74-1, Quality and Reliability Assurance, AFOEHL, Brooks AFB TX 78235-5501 (23 February 1990).

4. Analytical Services Division Laboratory Analysis Contracts, F33615-90-D-4000 to -D-4004. Issued 2 March 1990 by ASD/PMRSA, Wright-Patterson AFB Ohio.

5. Policies and Guidelines of the Laboratory Accreditation Committee, American Industrial Hygiene Association Laboratory Accreditation Program, AIHA, Akron Ohio.

6. EPA 570/9-90-008, Manual for Certification of Laboratories Analyzing Drinking Water. Washington DC: US Government Printing Office (1990).

7. Standard Methods for the Examination of Water and Wastewater, 17th Edition. Baltimore MD: Port City Press (1989).

8. NIOSH Manual of Analytical Methods, D.C. Taylor ed., 3rd ed., DHEW (NIOSH) Publication, Cincinnati Ohio (May 1989).

9. EPA Test Methods for Evaluating Solid Waste, SW-846, Vol. IA-IC and II, Washington DC: US Government Printing Office (Nov 1986).

APPENDIX A

IG WRITE UP OF A LABORATORY INVESTIGATION

INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
400 ARMY NAVY DRIVE
ARLINGTON, VIRGINIA 22202-2884

DEC 20 1989

(Investigations)

MEMORANDUM FOR DIRECTOR, PROCUREMENT FRAUD DIVISION, JUDGE
ADVOCATE GENERAL, DEPARTMENT OF THE ARMY
INSPECTOR GENERAL OF THE NAVY
INSPECTOR GENERAL, DEPARTMENT OF THE AIR FORCE
GENERAL COUNSEL, DEFENSE LOGISTICS AGENCY

SUBJECT: Notification of Defective Product

On July 6, 1989, the Office of the Inspector General (OIG), Department of Defense (DoD), Defense Criminal Investigative Service (DCIS) initiated an investigation (DCIS case control No. 8910698U-06-JUL-89-40SL-E0AH), into allegations that MetaTrace, Incorporated, Earth City, MO, had provided the DoD false testing data on environmental samples.

MetaTrace is a testing laboratory which detects toxic waste and other impurities in water and soil. MetaTrace is performing on numerous DoD contracts for the following sites:

Lakehurst Naval Air Station
Blossom Point
Iowa Army Ammunition Plant
Joliet Army Ammunition Plant
AP Hill
Rocky Mountain Arsenal
Fort Leonard Wood
Great Lakes Naval Training Center
Lexington Blue Grass Army Depot
Chanute Air Force Base
Grissom Air Force Base
Badger Army Ammunition Plant
Duluth Air National Guard
Fort Rucker
Goodfellow Air Force Base
Sheppard Air Force Base
Fort Meade/Gaithersburg
Picatiny Arsenal
Whidby Island
St. Louis Ordinance Plant
Fort Bliss
Michigan Air National Guard
Watertown Army Material Technology Laboratory
Loring Air Force Base
Military Ocean Terminal Bayonne

Incidents of the following have been uncovered:

1. Samples received were not tested in compliance with the Contract Laboratory Program (CLP) protocol as required by the Environmental Protection Agency (EPA). Quality control results for calibration and check standards that did not meet the CLP protocol were electronically replaced by gas chromatograph laboratory personnel. Basically, test data was electronically

manipulated by switching standards that did not meet the DoD criteria with results which did meet the criteria.

2. Test calibration curves for the analytical samples were determined subsequent to the samples being tested. The U.S. Army Toxic and Hazardous Material Agency (THAMA), Quality Assurance Program, requires that calibration curves be determined prior to the samples being analyzed.

3. Data packages for volatile organics and semi-volatile organics had manual integrations performed on daily calibration standards. Allegedly the gas chromatographic/mass spectrographic (GCMS) peaks were manually integrated so that the daily calibration standards would meet the criteria set forth in the THAMA Quality Assurance Manual.

4. It was noted during the pesticide sampling, the concentration of the calibration solution used for a particular chemical was altered. Data packages disclosed copies of chromatograms reflecting that the DoD calibration standards were injected at the same time and date, but with two different concentrations. The concentration of the daily calibration standard is determined by comparing the area under the chromatographic peak with standards of known concentrations. The analyst that changed the concentration of the daily calibration standard changed the actual concentration value, but did not change the area under the peak. Instances were noted whereby the same calibration standard was used in some lots and the concentration was sighted as twice the altered value. The standard preparation log, which reflects how the standard is prepared, disclosed that the volume of the chemical used to prepare the standard in question had been changed. The original entry was shown to have been made on one date and the change made several months thereafter.

5. All samples sent to MetaTrace contain a "holding time" date, i.e. the samples have to be tested before a certain date. If tested after this date, the toxicity of the chemical has been weakened and the test is invalid. MetaTrace employees were able to change the sample test dates by re-booting the computer in order to meet "holding time" dates.

This information is provided for any action deemed appropriate, to include assurances that all required safety alerts are properly executed. Should additional information be required, please contact Special Agent Eugene Duplicki, of my staff, at (202) 693-0029.

William G. Dupree
Deputy Assistant Inspector General
for Investigations

APPENDIX B

ANALYTICAL CHEMISTRY EQUIPMENT LIST OF A CONTRACT LABORATORY

MAJOR ANALYTICAL CHEMISTRY EQUIPMENT
OF ONE OF AFOEHL/SA's CONTRACT LABs

4 GAS CHROMATOGRAPH/MASS SPECTROMETERS:

Finnigan MAT Incos-50 Quadrupole with Computer Controlled GC(3)
Hewlett-Packard 5985B

7 GAS CHROMATOGRAPHS:

Perkin-Elmer Sigma 1 Analyzer
Perkin-Elmer Sigma Instrument
Hewlett-Packard 5890 (3)
Perkin-Elmer Series 300
Perkin-Elmer Sigma 3

2 HIGH PRESSURE LIQUID CHROMATOGRAPHS:

Perkin-Elmer Series 3B (2)

12 GC DETECTORS:

Flame Ionization (5)
Nitrogen Phosphorus (1)
Hall Halogen Specific (2)
Electron Capture (3)
Thermal Conductivity

16 AUTOSAMPLERS:

Tekmar Purge and Trap (5)
Hewlett-Packard 7671A (3)
Hewlett-Packard 7673A (5)
Perkin-Elmer AS 300
Perkin-Elmer 4990
Rheodyne 70-10

1 INFRARED SPECTROPHOTOMETER:

Perkin-Elmer Model 1310

2 ULTRAVIOLET SPECTOPHOTOMETERS:

Perkin-Elmer LC-75 Detector
Sequoia-Turner 340

1 INDUCTIVELY COUPLED PLASMA:

Leeman Labs Model I

3 ATOMIC ABSORPTION SPECTROMETERS:

Varian 475 series
Perkin-Elmer Model 603
Varian Spectra AA-40A Automatic Double Beam with GTA-96
Graphite Tube Automizer, VGA-76 Automatic Vapor Generation and PSC-76 Programmable Sample Changer

2 TOTAL ORGANIC HALIDES (TOX):

Dohrmann MC-1 (DX-20)

1 TOTAL ORGANIC CARBON ANALYZER:

Astro 2001

4 SPECTROPHOTOMETERS:

Bauch & Lomb Spectronic 70 (2)
Milton Roy Spectronic 601
Shimadzu Model UV-120-01

TCLP WASTE CHARACTERIZATION APPARATUS:

Millipore Pressure Filtration (1)
Rotary Agitators - 16 Units (2)
Associated Design - Zero Headspace Extractors (6)

ELECTROCHEMICAL INSTRUMENTATION:

Orion Research Model 231
Fisher Accumet pH Meter
Orion Model 801 pH Ionalyzer
Orion Model 701A pH Ionalyzer
Hach pH Meter
Corning pH/ISE Meter 620
Electrodes for Fluoride, Ammonia, Chloride, pH and Dissolved Oxygen
Yellow Spring Salinity and Conductivity Meter
HIAC NT-620 Turbidimeter

APPENDIX C

RESUME OF AN ANALYTICAL CHEMISTRY LABORATORY MANAGER

LABORATORY MANAGER

AREA OF EXPERTISE

Professional experience in the management of an environmental and industrial hygiene laboratory. Management expertise includes technical direction, staffing, budgeting, marketing, proposal and report development, and project management involving multidisciplinary teams. Laboratory expertise in analysis of industrial hygiene and environmental samples using gas chromatography (GC), gas chromatography/mass spectometry (GC/MS), atomic absorption (AA), x-ray diffraction (XRD), and wet chemistry (WC) techniques.

EDUCATION

Graduate studies, Forensic Science
Michigan State University, 1975-1976
East Lansing, Michigan

B.S., Chemistry
Eastern Michigan University, 1975
Ypsilanti, Michigan

PROFESSIONAL CERTIFICATION

Certified by the American Board of Industrial Hygiene (ABIH) in the chemical aspects of industrial hygiene.

PROFESSIONAL DEVELOPMENT

Various management seminars, 1979 to 1988
Proposal Writing Skills, 1983

LABORATORY EXPERIENCE

Present Laboratory
January 1979 to present

Management of an AIHA-accredited and EPA CLP laboratory, including supervision of over 60 environmental chemists and technicians. Responsible for:

* Laboratory quality assurance program, including management of participation in the AIHA Proficiency Analytical Testing (PAT) program, federal EPA quality assurance programs, and the Center for Disease Control

and State of Michigan quality control programs for biological samples.

* All aspects of laboratory financial planning, budget preparation, performance and salary review, and capital expenditures.

* Design and preparation of proposals and analytical reports.

* Laboratory safety program, including routine inspections and meetings with department heads to discuss and resolve potential safety problems.

* Experienced in project management involving multidisciplinary teams. Projects managed include:

  - Collaborative study for ethylene oxide for the Ethlene Oxide Industry Council of the Chemical Manufacturers Association. The method chosen for the study was charcoal tube collection and subsequent gas chromatographic analyses. The charcoal collection method was studied under different challenge concentrations of EO and humidity conditions, determination of breakthrough volumes, and field validation studies. The program also tested the precision and accuracy of the GC method through a collaborative testing program involving 20 laboratories from industry, consulting firms, government, and academia.

  - Development of multipurpose sampling media for use at hazardous waste sites.

  - Modified method to separate aromatic/aliphatic organics for occupational exposures to coal tar pitch volatiles.

  - Round-robin free silica methods validation for the National Institute for Occupational Safety and Health (NIOSH).

  - Collaborative study for methyl chloride, including collection and analysis.

  - Conducted in-house laboratory experiments to study thermal decomposition products of various plastic resins, including styrene. Similar projects have been conducted for glue products.

  - Industy-wide waste characterization survey for an industry association. Over 350 waste streams were

sampled and analyzed for EP Toxicity (eight metals and six organics).

- Conducted extensive indoor air investigation of a public building involving industrial hygiene and engineering professionals.

Environmental Chemist
October 1976 to December 1978

* Analysis of industrial hygiene samples using NIOSH Manual of Analytical Methods, Second and Third Editions, and OSHA Manual of Analytical Methods.

Specialty areas included organic solvents and metals analyses.

* Operation of atomic absorption instrumentation including flame, graphite furnace, hydride, and cold vapor techniques.

* Wet chemistry techniques including colorimeteric, ion selective electrode, and titrimetric methods.

* Analysis of water, wastewater, hazardous waste, and soils using soils using gas chromatography and atomic absorption spectrophotometry techniques.

* Analysis of air pollution samples using gravimetric, wet chemistry, and atomic absorption spectrophotometry techniques.

* Analysis of industrial hygiene samples and bulk samples using x-ray diffraction following NIOSH method 7500, Third Edition.

* Analysis of industrial hygiene samples for fiber count by phase-contrast microscopy (PCM) using NIOSH 7400, Third Edition, A Counting Rules

* Operation of packed column gas chromatography (GC) systems, coupled with FID, NPD, PID, HECD, FPD, and ECD systems.

* Operation of mass spectrometry systems using electron impact techniques.

* Extraction techniques for water, wastewater, hazardous waste, and soils including liquid/liquid, liquid/solid, ultrasonic probe, Soxhlet, and continuous extraction techniques. Sample preparation techniques include acid cleanup and sulfur cleanup.

OTHER RELEVANT EXPERIENCE

Conduct course instruction on industrial hygiene sampling and analytical procedures. Courses include:

* Present Laboratory
  Asbestos Sampling and Analysis Course (NIOSH 582 Equivalent)

* Wayne State University
  Graduate course in Industrial Hygiene Sampling and Analytical Methods

* Michigan Industrial Hygiene Society
  Refresher course in Industrial Hygiene Analytical Methods

PROFESSIONAL AFFILIATIONS

Air and Waste Management Association
American Chemical Society
American Industrial Hygiene Association (AIHA)
AIHA Board of Directors, 1988-1991
AIHA Laboratory Accreditation Committee, 1982-1987
Chairman, 1985-1986
American Society of Quality Control
British Occupational Hygiene Association
Michigan Industrial Hygiene Society
Secretary, 1987-1990
Board of Directors, 1984-1986

PUBLICATIONS/PRESENTATIONS

AIHA Laboratory Accreditation Program. Presented at the Professional Conference on Industrial Hygiene (PCIH) in San Diego, California, September 1987.

AHIA Accredition Programs for Asbestos. Presented at the National Asbestos Council (NAC) Professional Development Course in Boston, Massachusetts, September 1988 and in Atlanta, Georgia, February 1987.

"Collaborative Study for the Proposed ASTM Monitoring Method for Ethylene Oxide." Presented at the National Meeting of the American Chemical Society in Washington, D.C., August 1983, and at the American Industrial Hygiene Conference in Detroit, Michigan, May 1984.

"Aromatic/Aliphatic Separations in Determining CTPV Compliance." Presented at the American Industrial Hygiene Conference in Portland, Oregon, May 1981.

"Development of PNA Index for Oils." Presented at the American Industrial Hygiene Conference in Portland, Oregon, May 1981.

"Trace Sediments of the Huron River by Atomic Absorption,." Presented to the Michigan Association for the Advancement of Arts and Sciences, 1975.

APPENDIX D

A SUITABLE EXAMPLE OF A QA PROGRAM

QUALITY ASSURANCE

The most important aspect of the proposed USAF contract work is the timely reporting of accurate and reliable analytical results for each sample set. We have established a dynamic and effective laboratory Quality Assurance Program to assist in the generation of accurate data. The Quality Assurance practices, policies, and procedures which apply to this proposed work are specifically documented in each of two of our Quality Assurance (QA) publications: (1) The Industrial Hygiene Chemistry QA Manual; and (2) The Environmental Chemistry QA Manual. (These manuals are available for inspection and review by USAF personnel as required.) In addition to these standard manuals, we also propose to follow (for USAF work) the EPA Handbook for Analytical Quality Control in Water and Wastewater Laboratories (EPA-600/4-79-019), and NIOSH Industrial Hygiene Service Laboratory Quality Control Manual (Technical Report No. 78, 1974), as well as procedures recommended by the American Industrial Hygiene Association (AIHA) (e.g., the Quality Assurance Manual for Industrial Hygiene Chemistry prepared and performed in 1988 by the Analytical Chemistry Committee of AIHA), as applicable. We also propose the inclusion of the following items as part of the QA activities for this work. All analytical procedures will be documented and available for review. Instruments and procedures will be calibrated, as appropriate, using NBS standard reference material or NBS calibration and certification procedures. We will participate in interlaboratory Comparison Programs conducted by NIOSH (PAT), EPA, CDC, and Utah State Department of Health (for EPA certification). These programs are currently in effect at our laboratory. We will be fully cooperative in participating with USAF OEHL with respect to intercomparison programs. Such intercomparisons may consist of either split samples or other special samples provided by USAF OEHL.

Selected items from our QA program as it relates specifically to the proposed industrial hygiene/ environmental chemistry work are provided in the following.

Staffing for Quality Assurance

The Laboratory Manager, will be responsible for the reliability of all analytical data generated under this contract program. We propose as the Supervisor of Quality Assurance activities relating to the work. He is currently the Manager of our Quality Assurance Section. He is directly responsible to the laboratory manager. He operates independently, however, of the Operational Section

Managers, who are directly responsible for the production of the required analytical data. Therefore, he is free from potential conflicts of interest which can arise with respect to data production versus data quality. He has the authority to stop production when quality assurance standards are not met.

APPENDIX E
EXAMPLE OF A CONTRACT FIXED PRICED ORDER WITH ONE OF AFOEHL/SA COMPETITIVELY PRICED CONTRACT LABORATORIES.

F33615-90-D-4004 ORDER: 0007

Item	Description	Method	NR. Ordered	Unit Price	Discount Rate %	Sub Total	Total
1a	Nitrates	E353.2	50	$13.68	9%	$684.00	622.44
1a	Total Phos.	E365.4	25	19.00	6	475.00	446.50
1a	Alkalinity	E310.1	100	13.68	12	1368.00	1203.00
1a	Chloride	E325.2	25	13.68	6	342.00	321.48
1a	Fluoride	E340.2	25	12.64	6	316.00	297.04
1a	Total Dissolved Solids	E160.1	25	10.55	6	263.75	247.92
1a	Sulfate	E375.2	25	12.64	6	316.00	297.04
1b	Metals	SW6010	11	156.75	2	1724.25	1689.76
1c	Organochlorine Pesticides and PCB's	E608	50	120.03	9	6001.50	5461.36
1d	Organophos. Pesticides	SW8140	50	115.52	9	5776.00	5256.16
1e	Chlorinated Herbicides	SW8150	25	78.85	6	1971.25	1852.97
1f	Volatile Organics	E624	25	234.65	6	5866.25	5514.27
1g	Extractables	E625	25	451.25	6	11281.25	10604.27
1h	Semivolatile Organics	SW8270	12	509.91	2	6118.92	5996.54
1i	Explosives	USATHAMA	11	684.00	2	7524.00	7373.52
							$47185.27
2.	Shipping and Mailing						$2814.73
	Total						$50000.00

APPENDIX F

CERTIFICATIONS OF AN AFOEHL/SA CONTRACT LABORATORY

LABORATORY CERTIFICATION/ACCREDITATION

Our analytical chemistry laboratory holds the following accreditations/certifications:

American Association of Laboratory Accreditation

It is accredited by the American Association for Laboratory Accreditation for construction materials testing, geotechnical testing, and chemical testing. This accreditation is based on a formal physical inspection ascertaining that a formal quality assurance/quality control program has been established and is being used. The QA/QC program identifies the operating procedures and provides proper documentation of equipment, maintenance, calibration, testing, reporting, technician training, etc.

American Industrial Hygiene Association

The Environmental Chemistry Laboratory is accredited by the American Industrial Hygiene Association for the analysis of metals, asbestos, and organics. This prestigious accreditation is given only to laboratories who have demonstrated proficiency in industrial hygiene analysis by successfully analyzing, on a quarterly basis, EPA proficiency samples and passing a rigorous on-site inspection.

Texas Water Commission

The Environmental Chemistry Laboratory is approved by the Texas Water Commission for the analysis of wastewater and stream monitoring samples, hazardous waste, Superfund, underground injection and underground storage tank program samples. Approval is based in a thorough on-site quality assurance inspection and the successful analysis of the EPA's Water Pollution Performance Evaluation Study samples.

Oklahoma Water Resources Board

The Environmental Chemistry Laboratory is certified by the Oklahoma Water Resources Board for the analysis of wastewater parameters as required under the OWRB's Waste Disposal Permit Program and the EPA's NPDES Program. Certification is granted by test parameter from the successful analysis of OWRB's Performance Evaluation samples.

Florida Department of Health and Rehabilitative Services

The Environmental Chemistry Laboratory is in the final stages of certification by the Florida Department of Health and Rehabilitation Services for the analysis of drinking water. Certification is based on a rigorous on-site inspection and the continual successful participation in the EPA's Water Supply Study.

United States Department of Commerce, National Institute of Standards and Technology

The Environmental Chemistry Laboratory is accredited under the National Voluntary Laboratory Accreditation (NVLAP) Bulk Asbestos Program. The accreditation is given after a thorough inspection by a NIST technical expert and the continual successful participation in the NVLAP Proficiency Testing Program. All laboratories which perform analyses of asbestos materials for schools must hold this accreditation.

APPENDIX G

EXAMPLE OF AN AFOEHL ISSUED CONTRACT WORK ORDER LISTING CONTRACTOR INSTRUCTIONS AND RESPONSIBILITIES

ANALYSIS OF OCCUPATIONAL AND ENVIRONMENTAL TYPE SAMPLES

I. DESCRIPTION OF TASK

The contractor shall analyze government-furnished samples provided to the contractor in contractor furnished packing and mailing as follows:

1. Water Samples

a. Analyze water samples for nitrates, total phosphates, alkalinity, chloride, fluoride, total dissolved solids, and sulfate using appropriate EPA methodology.

b. Analyze water samples for metal content using appropriate EPA methodology.

c. Analyze water samples for pesticides and PCBs using EPA method 608.

d. Analyze water samples for organophosphate pesticides using EPA method SW8140.

e. Analyze water samples for chlorinated herbicides using EPA method SW8150.

f. Analyze water samples for volatile organics using EPA method 624.

g. Analyze water samples for acid, base, and neutral extractables using EPA method 625.

h. Analyze water samples for semivolatiles to include: resorcinol, hexachloroethane, 2-nitrodiphenylamine, and 2-nitronapthalene. Use EPA method SW8270.

i. Analyze for explosive residues in water to include: nitrobenzene; 2,4,6-TNT; 2,6-DNT; HMX.RD.; tetryl; 2-amino-4,6-DNT; picric acid, nitoglycerine, nitrocellulose, and nitroguanidine. Use USATHAMA methodology.

2. The contractor shall provide packing and mailing for government furnished containers. The contractor shall provide shipping containers, volatile sample containers and shipping to USAF field activities.

3. Laboratories must comply with the analytical QA/QC requirements specified by each of the methods listed.

4. The cost associated with analyzing the laboratory QA/QC samples specified by the method are to be included in the contract price charged for that method. The contractor shall not charge for laboratory QA/QC samples as separate costs.

5. The price for each solid waste analysis method must include the quality procedures specified in SW-846, Third Edition, First Update, as follows:

a. Sections 1.2 and 1.3 of Chapter 1.

b. Section 8.0 of Chapters 3 through 8.

c. Chapter 10.

6. If requested, a SW-846 Quality Control Documentation Package shall be furnished with sample analytical results. The documentation package shall be provided as specified in SW-846, Third Edition, First Update, whenever this methodology is required for analyses. Samples analyzed shall be identified in the Quality Control Documentation Package.

7. For gas chromatographic (GC) methods, the government will pay for all confirmational analyses (i.e., second column, third column, etc.) at the same rate charged for the first column analysis. Do not include the cost of performing confirmational analyses in the basic contract price charged for the method.

8. Prices of screening methods, such as E601 and SW8010, shall include every analyte listed in the method. The resulting written report shall include all the analytes listed on the requested method.

9. Analyses must be performed within the maximum allowable holding time specified by the applicable method or by EPA regulation. For samples analyzed by gas chromatography, the maximum allowable holding time applies to first column and all confirmational runs.

10. All prices are based on a fifteen (15) working day sample turn-around time. A written report of the analytical test results must be produced within 15 working days after receipt of the sample in the laboratory.

11. The price listed for each analytical method shall include the cost of processing, reducing, and delivering the following process data:

a. If used, a copy of the signed chain-of-custody form showing date and time of sample receipt in the laboratory.

b. A cross-reference of field sample number to laboratory sample number.

c. Sample collection, extraction (if applicable), analysis and report dates.

d. A list of the instrument and method detection limit for every analyte reported.

e. A list of practical quantitation limits for every analyte reported.

f. Analytical method used.

12. Laboratories shall archive all analytical data for a minimum of five years.

II. SITE LOCATION AND DATES: N/A

III. BASE SUPPORT: NONE

IV. GOVERNMENT FURNISHED PROPERTY: N/A

V. GOVERNMENT TECHNICAL POINT OF CONTACT:

Thomas C. Thomas AFOEHL/SA Brooks AFB, Tx. 78235-5501 512-536-3626	Leopoldo Rodriguez AFOEHL/SAT Brooks AFB, TX. 78235-5501 512-536-3626

VI. In addition to sequence numbers 1 and 5 in Attachment 1 to the contract the sequence number listed below is applicable to this order:

Sequence No.	Block 10	Block 11	Block 12	Block 13
2 (Atch 3)	Biweekly	*	**	**

* Two weeks after receipt of samples
** Upon completion of analyses

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